

## GREEN BAY BROWN TROUT MANAGEMENT AND FALL TRIBUTARY SURVEYS

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This report summarizes assessments and management actions for brown trout in Wisconsin water of Green Bay/Lake Michigan completed in 2016.

### Introduction

The Wisconsin Department of Natural Resources (WDNR) has stocked various salmonid species into Green Bay since the 1960's. The initial intent of that stocking effort was to control introduced prey species like alewives and rainbow smelt while providing a quality near shore and offshore fishery for Green Bay anglers. Brown trout provided a consistent early season (April-May) nearshore and summer trolling fishery, along with other stocked salmonines. Creel survey results indicate that harvest and return rates for Green Bay brown trout were exceptional throughout the late 1980's and 1990's. Since 2000, brown trout fishing has experienced a sharp decline. Stocking numbers for Green Bay have varied somewhat since the 1980's but, in general, remain fairly consistent until 2010 when fingerling stocking was greatly reduced. Between 2011 and 2015, only yearling brown trout were stocked into Green Bay (Figure 1).

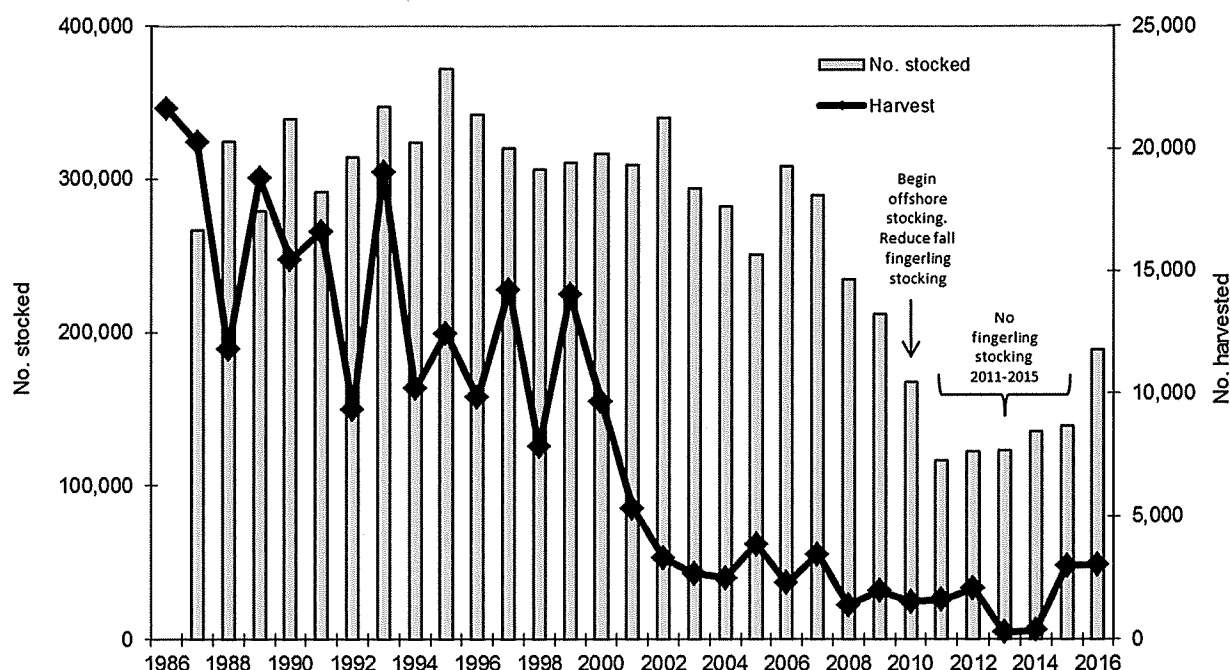


Figure 1. Number of stocked and harvested brown trout in Wisconsin waters of Green Bay by year. Fingerling stocking was reduced in 2010 and eliminated from 2011-2015.

Historically, WDNR stocked several strains and age classes of brown trout into Green Bay and adjacent rivers including: Wild Rose domestic, Wild Rose feral, and St. Croix domestic. To promote an extended trophy fishery, the seeforellen (German) brown trout program was initiated in Green Bay waters in the early 1990's. From 1991 to 2016, Wild Rose domestic and seeforellen strains comprised the majority of brown trout stocking into Wisconsin waters of Lake Michigan although limited numbers of St. Croix brown trout have been stocked as surplus or substituted for Wild Rose domestics throughout the years. A 1996 strain evaluation on Wild Rose domestic, Wild Rose feral, and seeforellen indicated similar rates of returns for age-2 BNT, while seeforellen appeared to live longer and grow faster, thus adding to the trophy element of the fishery<sup>1</sup>.

<sup>1</sup> Belonger, B. 1996. Brown trout strain evaluation. Pages 55-56 in Lake Michigan Management Reports to Great Lakes Fishery Commission, Wisconsin Dept. of Nat. Res., Madison, WI.

### **Background on Seeforellen Strain of Brown Trout**

The first seeforellen strain brown trout were stocked in Wisconsin in 1991. WDNR obtained eggs from the State of New York in late 1989-early 1990. The goal was to promote an extended trophy fishery, as seeforellen tend to live a year or two longer and spawn a month or two later in the fall compared to domestic strains of brown trout.

The Menominee River has been surveyed using an electroshocking boat over several weeks each fall since 1992. The purpose of the weekly surveys on the Menominee River was to collect seeforellen brood stock and transport to a hatchery facility for gamete collection (1992-2009). During that time, the Menominee River was one of three brood rivers for seeforellen brown trout. The other brood rivers in Wisconsin were the Kewaunee (Kewaunee Co.) and Root Rivers (Racine Co). From 1992 through 2006, brood fish were transported to Wild Rose Hatchery. Beginning in 2007, brood stock were transported to Besadny Anadromous Fish Facility (BAFF) in Kewaunee. This change was a result of Viral Hemorrhagic Septicemia virus (VHSV) being confirmed in Lake Michigan and Lake Winnebago, followed by concerns with potentially introducing the disease to the Wild Rose Hatchery. Gametes were collected and fertilized at BAFF and the fertilized eggs were disinfected using iodine, an approved VHSV disinfecting protocol, and transported to the Wild Rose Hatchery.

Several years of low numbers of seeforellen brown trout captured in the Menominee River prompted the WDNR to discontinue utilizing the Menominee River as a brood river beginning in 2010 and to move that quota of seeforellen to the Stone Quarry adjacent to the Sturgeon Bay shipping canal in Door County. Other recent changes to the brown trout stocking practices in Green Bay include offshore stocking using various methods USFWS M/V Spencer Baird and WDNR pontoon net pen in 2010 and 2011. Beginning in 2012, the WDNR RV Coregonus has been used to stock Green Bay brown trout offshore. To gauge the relative success of the offshore stocking, the portion of brown trout still stocked nearshore were marked using an adipose and one other unique fin clip each year. These clipped fish were stocked at the Stone Quarry/Sturgeon Bay canal through the ice in early February from 2010 to 2015. Due to low returns of those clipped fish, that quota was moved back to the Menominee River beginning in 2016. The offshore stocking strategy was initiated as a result of low harvest returns on brown trout and concerns with post-stocking survival in the Green Bay tributaries which have significant walleye runs in April. Those walleye spawning runs often coincide with the timing of stocking brown trout.

Until 2016, approximately 320,000 seeforellen were stocked in Wisconsin waters of Lake Michigan. Roughly 30,000 seeforellen yearlings were stocked annually into each brood river (Kewaunee and Root Rivers) and each year class of fish had a unique clip (adipose + one other clip). The adipose clip is to designate that a fish is a seeforellen and allows us to pass on that genetic line. The other fin clip allows us to tell the age of the fish since that clip changes annually. Several years of declining seeforellen returns in the Kewaunee River beginning around 2009 prompted the WDNR to add the Sheboygan River as a third brood river beginning in 2015 and therefore receive clipped seeforellen for recapture in subsequent years.

In an attempt to increase returns of seeforellen in the Kewaunee River, an alternative stocking method was pursued in 2015. A total of 2,208 seeforellen were given a unique clip (adipose + dorsal + left pectoral) and stocked in three net pens (one 24' x 6' x 4' pen and two 8' x 4' x 4' pens) on April 13, 2015. After being held and fed within the pens for 15 days, fish were released on April 28. For the release, brown trout from the two smaller pens were carefully dumped into the larger pen (at the dock) and the larger pen was slowly towed downstream about one mile at dusk to release the fish just outside the harbor in Lake Michigan. An additional 33,238 seeforellen stocked into the Kewaunee River in 2015 were given an adipose + left pectoral clip. Due to fish health issues with net penned Kewaunee River Chinook salmon in 2015, a net pen was not used for brown trout in 2016.

In July 2016, staff from U.S. Fish and Wildlife Service Green Bay Fishery Resources office (USFWS-GBFRO) utilized a mass marking autotrailer to adipose clip all seeforellen at Wild Rose Hatchery that were later stocked into Lake Michigan as yearlings in 2017. This was the first time that brown trout were clipped using the trailer and the effort took 41.4 hours (J. Webster, USFWS pers. comm.). Marking all seeforellen will save time and allow WDNR to evaluate returns of seeforellen by being able to distinguish Wisconsin stocked seeforellen from other strains of brown trout stocked by nearby states or wild brown trout captured in creel surveys and tributary surveys. Also, having all seeforellen with an adipose clip would

allow greater flexibility to collect broodstock from other rivers if needed, rather than relying only on the Root, Sheboygan, and Kewaunee Rivers as sources of known seeforellen.

### **Recent Stocking Decisions**

Return to creel of brown trout in Green Bay has fallen from an average of 4% prior to 2000 to 1% or less from 2001 to 2014. In 2015 and 2016, average return to creel of stocked brown trout was 2.2%. That estimate only considers Wisconsin stocked fish at Age-2. That age class was chosen because the majority of harvested fish are in the low 20-inch range and likely Age-2. A comprehensive review of brown trout data and related fisheries information was completed in 2009<sup>2</sup>. In 2010, we adopted a strategy to stock a portion of the brown trout offshore to avoid nearshore predators and to discontinue stocking fall fingerlings into Green Bay. That strategy seeks to adjust stocking strategies with the following management objective:

Two indices measured by creel surveys for Green Bay waters (% return and total harvest of brown trout) will trend towards the targets within five years of implementation of the plan. Results should indicate consistent returns from stocking levels. Fishing pressure will be considered in the analyses to determine if changes in harvest or return rate are associated with changes in effort. Lastly, catch per unit effort of fall electrofishing surveys in the lower Menominee River will continue to serve as a fishery-independent index of brown trout abundance in Green Bay.

The 2010 target indices are:

- a) Total harvest greater than or equal to 4% of number stocked BNT. This return rate is comparable to return rates for Green Bay prior to 2000; OR*
- b) Total harvest of 5,000 or more fish based on 126,000 yearlings stocked annually into Green Bay, AND*
- c) Brown trout harvest rate less than or equal to 23 hours per fish based on targeted total salmonid fishing effort.*

In October 2016, the WDNR decided to reduce brown trout stocking in Wisconsin waters of Lake Michigan in response to a declining forage base, poor returns and high costs of production. Brown trout stocking was reduced from approximately 693,000 to 356,000 for Wisconsin waters of Lake Michigan. As a result, the Wild Rose strain of brown trout was discontinued and the Thunder River Hatchery in Crivitz, WI was decommissioned. WDNR will stock only seeforellen brown trout beginning in 2017 and moving forward. Wild Rose strain brown trout being raised at Thunder River and Brule Hatcheries were stocked in 2016 as fall fingerlings instead of as yearlings in 2017. As a result, Green Bay received a one-time surplus of brown trout (Table 1).

In response to the brown trout stocking reduction, the WDNR evaluated the stocking locations and numbers of the seeforellen brown trout. The evaluation involved consultation with the Lake Michigan Fisheries Forum and the general public. Meetings were held in Dec 2016 and Jan 2017 to discuss stocking strategies and distribution for the remaining (seeforellen) brown trout. A stocking allocation strategy was developed that evenly distributes 75% of the quota across each county. Next, the strategy incorporates species specific harvest rates and directed effort for brown trout to allocate the remaining 25% of brown trout based on those parameters. Green Bay's portion of brown trout was reduced from 126,000 to 95,557. This new quota includes 75,557 yearlings and 20,000 fall fingerlings.

The 2010 management objective called for five years of offshore stocking. Full implementation did not begin until 2012, with the use of the newly acquired *RV Coregonus* and more consistent methods of offshore stocking compared to 2010 and 2011. WDNR plans to continue offshore stocking the yearling quota of brown trout into Green Bay at least through 2018. The fall fingerling quotas will be stocked directly into tributaries. An updated target index for total harvest is 3000 or more fish harvested based on 75,557 yearlings stocked (beginning in 2017), compared to 5000 or more fish harvested based on 126,000 yearlings stocked (2016 and earlier).

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<sup>2</sup> Brown trout issue brief. December 2009. Internal WDNR memo from Lake Michigan Fisheries Team to Fisheries Management Board.

Table 1. WDNR brown trout stocking information for Green Bay in 2016.

<i>Date</i>	<i>Location</i>	<i>Strain/Size</i>	<i>Number</i>	<i>Clip</i>	<i>Rearing Facility</i>	<i>Vessel Used</i>
1-Feb-2016	Under ice Grid 703	Seeforellen yearling	28,884	ARP	Wild Rose SFH	--
18-Apr-2016	Offshore Grid 804	Seeforellen yearling	25,974	--	Wild Rose SFH	RV Coregonus
19-Apr-2016	Offshore Grid 804	Seeforellen yearling	16,423	--	Wild Rose SFH	RV Coregonus
20-Apr-2016	Offshore Grid 703	Wild Rose yearling	32,560	--	Thunder River	RV Coregonus
21-Apr-2016	Offshore Grid 703	Wild Rose yearling	15,855	--	Thunder River	RV Coregonus
Oct-2016	Little River mouth	Wild Rose fingerling	5,901	--	Thunder River	--
Oct-2016	Peshtigo River at city garage	Wild Rose fingerling	4,035	--	Thunder River	--
Oct/Nov-2016	Menominee River at Stephenson Island	Wild Rose fingerling	22,001	--	Thunder River	--
Nov-2016	Little River mouth	Wild Rose fingerling	7,728	--	Brule	--
Nov-2016	Oconto River at Stiles	Wild Rose fingerling	10,415	--	Brule	--
Nov-2016	Peshtigo River at city garage	Wild Rose fingerling	9,895	--	Brule	--
Nov-2016	Menominee River at Stephenson Island	Wild Rose fingerling	8,707	--	Brule	--
		<b>Total yearlings</b>	<b>119,696</b>			
		<b>Total fingerlings</b>	<b>68,682</b>			

### Creel Results and Discussion

The harvest estimate for open water Green Bay brown trout in 2016 was 3011 fish, compared to the 2015 estimated harvest of 2925 brown trout. Annual harvest remained below the target of 5000 fish but is still improved from 2008 through 2014. Harvest rates also improved in 2016 (11 hours/fish), compared to 15 hours/fish in 2015 (Figure 2).

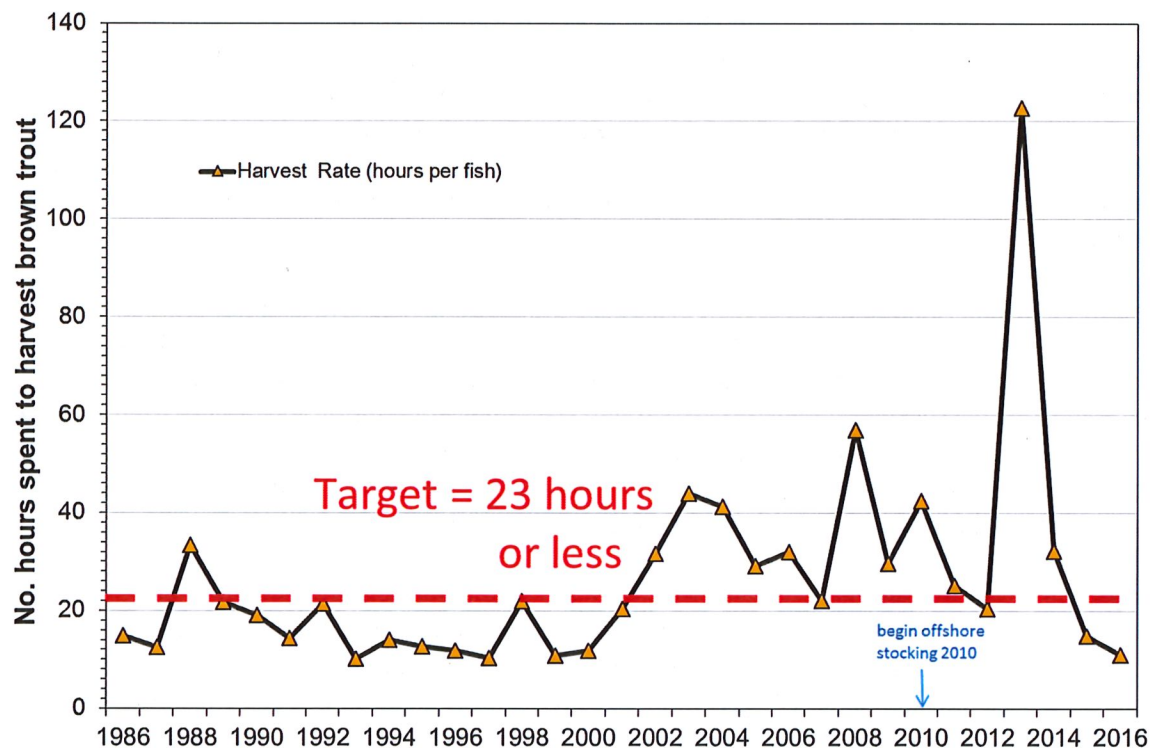


Figure 2. Harvest rate (hours per fish) for Green Bay brown trout, based on total salmonid fishing effort (angler hours) for Green Bay.

### **Brown Trout Derby**

The Marinette-Menominee Great Lakes Sportfishing Club has sponsored a summer Brown Trout Derby since 1981. Data sets from this derby indicate that upwards of one thousand brown trout were typically harvested during the two-day event. However, from 2001 to present, the number of brown trout registered in the derby is much lower than in the 1980's and 1990's. While weather and participation can play a large role in the two-day catches, the long-term trends in catches are reflective of annual harvest trends. In 2016, the number of brown trout registered was 41 fish (Table 2).

	<i>BROWN TROUT</i>		<i>CHINOOK</i>		<i>RAINBOW TROUT</i>		<i>WALLEYE</i>	
	#	Avg lb.	#	Avg lb.	#	Avg lb.	#	Avg lb.
2005	237	4.7	1694	5.8	32	5.7	29	5.2
2006	28	5.4	693	10	10	4.1	44	2.3
2007	143	5.9	969	8.5	54	6	22	2.9
2008	102	8.4	730	8.4	47	5.6	30	3.1
2009	26	7.8	444	8.7	18	6.5	21	3.1
2010	89	8	818	9.6	39	4.9	55	3.8
2011	13	8.5	87	9.6	10	5.5	231	2.8
2012*	211	6.89	344	10.36	165	4.53	23	3.84
2013*	16	7.90	60	9.82	7	8.96	13	4.50
2014*	70	7.4	97	11.3	13	7	14	4.5
2015*	189	7.0	205	11.0	57	5.5	18	5.8
2016*	41	7.0	219	8.9	64	6.5	16	6.4

\*Participants allowed to register only one fish per species per day beginning in 2012. Past rules allowed for all legal fish to be registered.

Table 2. Number and mean weights of fish harvested during the two-day Brown Trout Derby.

### **Floy-tagging Studies and Voluntary Fishing Logbooks**

Since 2009, WDNR and the Marinette-Menominee Great Lakes Sportfishing Club have cooperatively floy-tagged yearling trout that are stocked into the Menominee Marina for the club-sponsored annual Kid's Fishing Day. The goal of this tagging project is to gain information on harvest return and movement of fish. Excluding the fish that were harvested for the Kid's Fishing Day, the percent return from brown trout stocked has varied from zero to 5.9% (Table 3). These returns also include fish captured and released in fall electrofishing surveys or in the fish lift on the lower Menominee River.

Year	Species	Number	Avg. size (in.)	% return
2009	Brown trout	392	11.1	4.7
2010	Brown trout	772	8.6	0
2011	Rainbow trout	415	10.0	1.9
2012	Brown trout	1118	10.1	2.2
2013	Brown trout	947	10.6	2.7
2014	Brown trout	850	9.9	5.9
2015	Brown trout	864	10.4	5.7
2016	Rainbow trout	890	12.2	1.5

Table 3. Percent return (as of October 2017) of floy-tagged trout stocked by the Marinette-Menominee Great Lakes Sportfishing Club.

WDNR distributes voluntary fishing logbooks to anglers who frequently target brown trout on Green Bay. Data obtained from those logbooks is summarized in Table 4. The number of brown trout caught by participating anglers was substantially higher in 2012, 2015, and 2016 than in other years (Table 4). These three years of good brown trout fishing were also reflected in the overall Green Bay creel estimates (Figure 1). However, average catch per hour remained relatively consistent throughout these years.

Table 4. Information from voluntary fishing logbooks, 2010-2016.

	2010	2011	2012	2013	2014	2015	2016
# logbooks turned in	12	5	17	8	6	13	9
# brown trout caught	32	48	412	18	35	516	178
Average of Catch per Effort (hours per fish)	6.7	4.1	4.5	4.5	7.0	4.1	4.6
Average of length (in.)	24.4	21.7	22.1	19.8	20.6	21.6	21.7

### Menominee River Summary

Although the Menominee River is not currently a broodstock river for seeforellen, that river is surveyed regularly to collect information on fall runs of fish due to local angling interest in salmonids and to serve as a fishery-independent index of brown trout abundance. Between 2010 and 2015, WDNR stocked brown trout offshore and not directly into the Menominee River. Beginning in 2016, 28,884 uniquely clipped (adipose + right pectoral) seeforellen brown trout, along with 30,708 unclipped Wild Rose domestic strain fingerlings were stocked into the Menominee River (Table 1). Between 2010 and 2014, Michigan DNR annually stocked approximately 28,000 brown trout yearlings into the Menominee River. During that period, brown trout stocked by MDNR received a unique fin clip for each of the strains (Sturgeon River and Wild Rose). WDNR fall surveys have only captured six fish with a MDNR clip since 2010.

Electrofishing surveys targeting trout and salmon on the lower Menominee River were completed weekly beginning on September 20 and ending on November 29, 2016. The effort occurs over a ½ mile section of the river from the Stephenson Island boat landing to the Menominee dam. Seventy-six brown trout were captured (42 males; 34 females) (Table 3), with a mean length of 25.4 inches. Three brown trout had floy tags and were stocked by the M&M Great Lakes Sportfishing Club in the Menominee Marina in 2014 or 2015. The combined CPE for brown trout was 5.1 fish/hour, up from 2.7 fish/hour in 2015 (Figure 3). Dozens of fall fingerling brown trout recently stocked out of Thunder River and Brule Hatcheries were observed but are not included in the analysis. Twenty-nine rainbow trout and 63 pink salmon were captured in the Menominee River (Table 4). Chinook salmon with an adipose fin clip were collected and heads were sent to USFWS-GBFRO for coded wire tag analysis (Table 9). Chinook heads that were collected by Michigan DNR in the Menominee dam fish lift and by WDNR fall creel surveys at Little River are also listed in Table 9. Sixty-five percent of tagged Chinook salmon that were recovered were stocked into tributaries of the west shore of Green Bay.

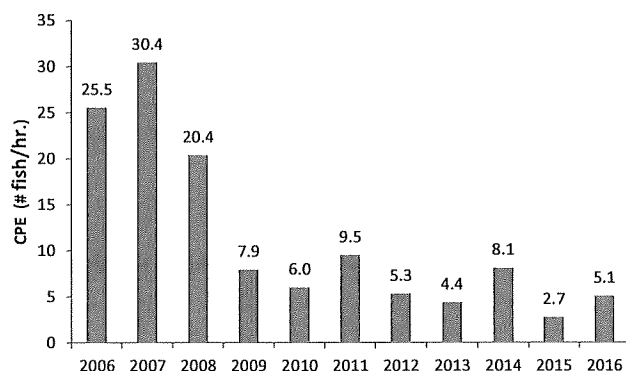


Figure 3. CPE (# fish/hour) of brown trout captured during fall electrofishing surveys on the lower Menominee River, 2006-2016.

In 2016, water levels in the lower Menominee River were high due to above normal Lake Michigan water levels. However, discharge from the river was mostly average throughout October, with the exception of October 24 (Table 5). High flows at nearly 6000 cubic feet per second may have contributed to good catches of brown trout on that date. Also, flow patterns were different from a typical year because the Menominee Dam was not generating power during October and much of November. The power generators are located on the Michigan side of the river. Excess flow that would normally be used to generate power was diverted through dam gates on the Wisconsin side of the river due to construction at the dam. In summary, the number of both brown trout and rainbow trout captured in the fall electrofishing surveys more than doubled from 2015 to 2016 (Table 8), with similar effort in both years. In the fall of 2015, Michigan DNR staff captured 115 adult brown trout in the Menominee dam fish lift compared to 32 in 2016.

Table 4. The length distribution of fish captured in the lower Menominee River, all 2016 fall surveys combined.

Length (in.)	Brown Trout	Rainbow Trout	Chinook Salmon
15		1	
16		2	
17	1	3	
18			
19		1	
20	1	1	
21	4	2	
22	7	6	
23	7		1
24	16	2	
25	11	2	
26	8	4	
27	11	2	1
28	2	1	
29	2	1	
30	4	1	
31	2		1
32			
33			
34			
35			
36			
37			
<b>TOTAL</b>	<b>76</b>	<b>29</b>	<b>3</b>

Table 5. Number of adult fish captured by species and date on the lower Menominee River.

Date	Water Temp	Flow (cfs)	Brown Trout	Rainbow Trout	Chinook Salmon	Pink Salmon
20-Sept-2016	68	3820	0	0	0	27
27-Sept-2016	60	3610	1	0	0	20
4-Oct-2016	63	2740	4	0	1	9
10-Oct-2016	57	2210	7	2	1	5
18-Oct-2016	59	2730	7	0	0	1
24-Oct-2016	49	5970	23	3	1	1
2-Nov-2016	48	3410	11	7	0	0
9-Nov-2016	47	2540	8	3	0	0
14-Nov-2016	42	2260	2	5	0	0
17-Nov-2016	47	2230	7	8	0	0
21-Nov-2016	36	2150	1	0	0	0
29-Nov-2016	41	3500	5	1	0	0
<b>TOTAL</b>			<b>76</b>	<b>29</b>	<b>3</b>	<b>63</b>

### **2016 Peshtigo River Summary**

Prior to 2015, the Peshtigo River was surveyed only periodically in the fall for salmonids. Beginning in 2015, the Peshtigo River has been surveyed on a similar schedule (weekly) as the Menominee River. Electrofishing surveys targeting trout and salmon were completed on the lower Peshtigo River from the city garage landing/RR bridge upstream to the riffle



that is approximately ¼ mile upstream from the boat landing. On some days, the boat was able to maneuver above the riffle to cover the additional stretch from the riffle upstream approximately 500 feet to the next shallow area. Surveys were completed weekly beginning on September 20 and ending on November 29, 2016. Nine brown trout were captured with a mean length of 22.7 inches. Twenty-three pink salmon were captured (11 males; 12 females) (Tables 6, 7, and 8). Nine Chinook salmon with adipose clips were kept for coded-wire tag extraction and heads were sent to USFWS-GBFRO for analysis (Table 9).

Table 6. The length distribution of fish captured in the lower Peshtigo River, all 2016 fall surveys combined.

Length (in.)	Brown Trout	Rainbow Trout	Chinook Salmon	Pink Salmon
15	1			
18				2
19				3
20				7
21				6
22	3			4
23	2			1
24	2			
25	1			
26				
27				
28				
29			2	
30				
31				
32				
33			2	
34			1	
35			1	
36				
37			1	
38			1	
39			1	
<b>TOTAL</b>	<b>9</b>	<b>0</b>	<b>9</b>	<b>23</b>

Table 7. Number of fish captured by species and date on the lower Peshtigo River.

Date	Water Temp	Flow (cfs)	Brown Trout	Rainbow Trout	Chinook Salmon	Pink Salmon
20-Sept-2016	65	993	0	0	0	4
28-Sept-2016	59	1020	0	0	2	16
4-Oct-2016	61	574	0	0	0	2
10-Oct-2016	57	611	0	0	3	0
18-Oct-2016	59	931	3	0	2	0
26-Oct-2016	47	1060	1	0	2	0
2-Nov-2016	49	845	1	0	0	0
7-Nov-2016	49	574	2	0	0	1
17-Nov-2016	45	532	1	0	0	0
29-Nov-2016	41	1300	1	0	0	0
<b>TOTAL</b>			<b>9</b>	<b>0</b>	<b>9</b>	<b>23</b>



Table 8. Number of fish by species caught in 2015 and 2016 in the Menominee and Peshtigo River fall electrofishing surveys.

	Menominee River		Peshtigo River	
	2015	2016	2015	2016
Brown trout	31	76	4	9
Rainbow trout	9	29	2	0
Chinook salmon	8	3	7	9
Pink salmon	0	63	28	23

Table 9. Stocking information from adipose-clipped Chinook salmon collected in Fall 2016. Data courtesy of USFWS-GBFRO mass marking program.

Capture Location	Capture Date	Length (inch)	Weight (lbs.)	Sex	CWT #	Year Stocked	Agency	Lake	Stocking Location
Little R	10/09/2016	33.8	11.0	F	640654	2014	WI DNR	Michigan	Gills Rock
Little R	10/06/2016	34.6	16.0	F	640517	2013	WI DNR	Michigan	Little R, Oconto R
Little R	10/06/2016	34.6	16.0	F	640517	2013	WI DNR	Michigan	Little R, Oconto R
Little R	10/06/2016	34.9	14.3	F	640517	2013	WI DNR	Michigan	Little R, Oconto R
Little R	10/06/2016	35.0	15.4	F	640517	2013	WI DNR	Michigan	Little R, Oconto R
Little R	10/06/2016	38.7	19.8	F	640517	2013	WI DNR	Michigan	Little R, Oconto R
Little R	10/06/2016	36.4	16.0	M	640517	2013	WI DNR	Michigan	Little R, Oconto R
Little R	10/09/2016	35.7	14.3	M	640517	2013	WI DNR	Michigan	Little R, Oconto R
Little R	10/09/2016	37.3	19.3	M	640517	2013	WI DNR	Michigan	Little R, Oconto R
Little R	10/12/2016	34.9	19.3	F	640517	2013	WI DNR	Michigan	Little R, Oconto R
Little R	10/12/2016	35.6	17.1	M	640517	2013	WI DNR	Michigan	Little R, Oconto R
Little R	10/12/2016	34.1	13.2	M	640517	2013	WI DNR	Michigan	Little R, Oconto R
Little R	10/12/2016	35.5	19.8	F	640517	2013	WI DNR	Michigan	Little R, Oconto R
Little R	10/12/2016	32.5	12.1	M	640656	2014	WI DNR	Michigan	Strawberry Creek
Little R	10/06/2016	38.4	15.4	M	640512	2013	MI DNR	Huron	Swan R
Little R	10/09/2016	32.6	12.7	F	640512	2013	MI DNR	Huron	Swan R
Men R lift	10/20/2016	30.5	9.5	U	640651	2014	IN DNR	Michigan	E Br Little Calumet R
Men R lift	10/17/2016	29.9	11	M	640658	2014	MI DNR	Michigan	Ford R & Manistique R
Men R lift	10/13/2016	34.9	14	M	640654	2014	WI DNR	Michigan	Gills Rock
Men R lift	10/17/2016	31.1	11	M	640654	2014	WI DNR	Michigan	Gills Rock
Men R lift	10/18/2016	34.3	14	M	640654	2014	WI DNR	Michigan	Gills Rock
Men R lift	10/19/2016	32.3	10.2	M	640654	2014	WI DNR	Michigan	Gills Rock
Men R lift	10/21/2016	31	15	F	640654	2014	WI DNR	Michigan	Gills Rock
Men R lift	10/18/2016	32	10	F	640388	2012	WI DNR	Michigan	Kewaunee & Manitowoc Cos.
Men R lift	10/19/2016	36.2	13	M	640517	2013	WI DNR	Michigan	Little R, Oconto R
Men R lift	10/20/2016	37.5	18	M	640517	2013	WI DNR	Michigan	Little R, Oconto R
Men R lift	10/08/2016	24.2	5.5	M	640772	2015	WI DNR	Michigan	Menominee R, Little R, Oconto R
Men R lift	10/10/2016	24.7	6	M	640772	2015	WI DNR	Michigan	Menominee R, Little R, Oconto R
Men R lift	10/12/2016	22.3	5	M	640772	2015	WI DNR	Michigan	Menominee R, Little R, Oconto R
Men R lift	10/17/2016	25.4	6	M	640772	2015	WI DNR	Michigan	Menominee R, Little R, Oconto R
Men R lift	10/19/2016	26.5	5.5	M	640772	2015	WI DNR	Michigan	Menominee R, Little R, Oconto R
Men R lift	10/20/2016	26.4	6.5	M	640772	2015	WI DNR	Michigan	Menominee R, Little R, Oconto R

Men R lift	10/21/2016	23.5	3	M	640772	2015	WI DNR	Michigan	Menominee R, Little R, Oconto R
Men R lift	10/24/2016	24.2	4.7	U	640772	2015	WI DNR	Michigan	Menominee R, Little R, Oconto R
Men R lift	10/25/2016	26	5.5	U	640772	2015	WI DNR	Michigan	Menominee R, Little R, Oconto R
Men R lift	10/27/2016	28.6	5	M	640772	2015	WI DNR	Michigan	Menominee R, Little R, Oconto R
Men R lift	10/28/2016	27	6.5	M	640772	2015	WI DNR	Michigan	Menominee R, Little R, Oconto R
Men R lift	10/28/2016	23.5	4.5	M	640772	2015	WI DNR	Michigan	Menominee R, Little R, Oconto R
Men R lift	10/28/2016	32.4	11	M	640662	2014	MI DNR	Huron	Nunns Creek & Cheboygan R
Men R survey	10/04/2016	31.5	14.4	M	640654	2014	WI DNR	Michigan	Gills Rock
Men R survey	10/10/2016	23.5	5.8	M	640772	2016	WI DNR	Michigan	Menominee R, Little R, Oconto R
Men R survey	10/24/2016	27	7.1	M	640772	2015	WI DNR	Michigan	Menominee R, Little R, Oconto R
Peshtigo R	10/18/2016	29.6	9.5	M	640654	2014	WI DNR	Michigan	Gills Rock
Peshtigo R	10/26/2016	29.9	8.1	M	640654	2014	WI DNR	Michigan	Gills Rock
Peshtigo R	10/10/2016	34.8	14.1	F	640517	2013	WI DNR	Michigan	Little R, Oconto R
Peshtigo R	10/10/2016	38.1	17.5	M	640517	2013	WI DNR	Michigan	Little R, Oconto R
Peshtigo R	10/10/2016	39.3	20.8	M	640517	2013	WI DNR	Michigan	Little R, Oconto R
Peshtigo R	10/18/2016	33.5	11.3	F	640517	2013	WI DNR	Michigan	Little R, Oconto R
Peshtigo R	10/26/2016	33.3	11.5	M	640311	2012	WI DNR	Michigan	Peshtigo R
Peshtigo R	09/28/2016	35.3	17.8	F	640522	2013	WI DNR	Michigan	Strawberry Creek
Peshtigo R	09/28/2016	37.3	19.5	M	640522	2013	WI DNR	Michigan	Strawberry Creek

Little R = Little River angler caught fish; Men R survey = Menominee River electrofishing survey; MR lift = Menominee River fish lift at dam; Peshtigo R = Peshtigo River electrofishing survey

### **Seeforellen Gamete Collection Summary**

Beginning in late October, WDNR crews use electroshocking boats on several rivers on Lake Michigan to collect seeforellen adults that are identified by a unique fin clip. Adult seeforellen are transferred to Besadny Anadromous Fish Facility where they are held in ponds. Once a week from mid-November to mid-December, staff collect eggs and milt from ripe adults. Fertilized eggs are transferred to the Wild Rose Hatchery. Fish that are not yet ready to spawn are returned to the ponds to be spawned at a later date until the goal of 1 million eggs is collected to fill Wisconsin's Lake Michigan and Lake Superior seeforellen quotas.

In 2016, WDNR sampled the Kewaunee River on 4 days between October 25 and November 21. Seeforellen catches continue to be low on the Kewaunee River (Table 10) but were improved from 2015 when only 23 fish were captured during six shocking events. The Root River was also sampled 6 days between November 1 and 16, 2016 using two electrofishing boats each day. One boat was used for a seventh sampling day, November 29, 2016. Fish were given a top caudal clip prior to being transported to BAFF to distinguish each fish as a Root River fish for data analysis purposes. WDNR also sampled the Sheboygan River on October 12, November 3, and November 10 using two boats on October 27 using one boat. Due to low numbers of seeforellen collected, fish were transported on only one day (11/3). Fish were given a bottom caudal clip prior to being transported to BAFF to distinguish each fish as a Sheboygan River fish for data analysis purposes.

In 2016, seeforellen gametes were collected at BAFF during four spawning events: November 16, 22, 29, and December 7. Fertilized, disinfected eggs were transported to Wild Rose Hatchery on each spawning date (Table 10). Thirty fish (15 males; 15 females) were evaluated for fish health on November 29. All other fish spawned were transported via stocking truck below the weir and released in the Kewaunee River. The Root River continues to have a skewed sex ratio of approximately 1 male for every 2 females. This ratio has been noted since 2008 in both the Root and Kewaunee Rivers,

when routine data collection for those two rivers began. The sex ratio for the Kewaunee River in 2016 was closer to 1:1, and the small sample from the Sheboygan River exhibits a skewed sex ratio with more females. In contrast, the Menominee River brown trout sex ratios continue to be close to 1:1 males to females, but that figure includes all strains.

Out of the 27 age-2 fish from the Kewaunee River (ALP clip), two fish (7.4%) had an ALP+dorsal clip, indicating they were from the 2015 net pen stocking event in the Kewaunee River. Of the clipped seeforellen stocked in the Kewaunee in 2015, 6.6% were net penned fish. Due to the low sample size of two fish in 2016, it is difficult to draw conclusions on brown trout net pen returns at this time.

There has been concern in recent years of fewer older fish contributing to the genetic lineage which could have impacts on the trophy potential of the seeforellen strain. In 2011, 23% of fish processed were age 4 and older. That percentage declined to 13% in 2012, 10% in 2013, and 5% in 2014. The proportion of age 4 and older fish increased to 11% in 2015, but dropped to only 5% in 2016 (Figure 4).

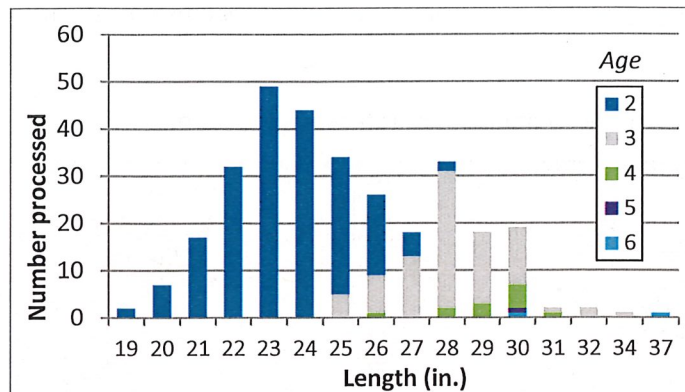


Figure 4. Length frequency by age of seeforellen processed at BAFF in 2016. Kewaunee, Root, and Sheboygan Rivers combined.

Table 10. Number of seeforellen brown trout processed for biological data at BAFF by river source and sex in 2016. Each day includes all fish not sent back to the ponds for later spawning. Gametes were not collected on every fish as some fish were spent. Mortalities removed from the pond are not included in this table.

Date	Root River		Kewaunee River		Sheboygan River		Eggs collected
	Males	Females	Males	Females	Males	Females	
16-Nov-2016	20	39	5	4	0	2	330,452
22-Nov-2016	22	43	4	10	1	1	409,960
29-Nov-2016	16	37	6	5	0	0	288,256
7-Dec-2016	20	62	6	7	0	0	307,476
<b>TOTAL</b>	<b>78</b>	<b>181</b>	<b>21</b>	<b>26</b>	<b>1</b>	<b>3</b>	<b>1,336,144</b>

### Summary

Beginning in 2017, all yearling brown trout that Wisconsin stocks into Lake Michigan receive an adipose fin clip through the efforts of the USFWS-GBFRO mass marking trailer. This will allow WDNR to further evaluate relative contributions of Wisconsin brown trout compared to unclipped brown trout stocked by Michigan DNR in northern Green Bay. We will utilize creel surveys, fall electroshocking surveys, fish registered at the Brown Trout Derby, and voluntary fishery logbooks to continue to evaluate the status of Green Bay brown trout. Seeforellen brood stock will continue to be collected in the Root, Sheboygan, and Kewaunee Rivers but greater flexibility on collecting brood stock from other rivers will be possible now that all seeforellen will be uniquely clipped. Fall assessments will also be conducted in the Menominee and Peshtigo rivers. WDNR plans to continue offshore stocking the yearling brown trout into Green Bay at least through 2018. The target indices will be evaluated and any major changes to management actions will be discussed with stakeholders.

### Acknowledgements

WDNR fisheries staff from Peshtigo and Sturgeon Bay offices participated in the Menominee and Peshtigo River surveys targeting trout and salmon. Creel clerk Kevin King collected angler caught Chinook from Little River. Michigan DNR Staff from the Northern Lake Michigan Management Unit collected Chinook from the Menominee dam fish lift. WDNR Fisheries staff from Green Bay and Besadny Anadromous Fish Facility collected fish on the Kewaunee River. WDNR



Fisheries staff from Milwaukee and Eagle collected and transported fish from the Root River. WDNR Fisheries staff from Milwaukee, Plymouth, and Eagle collected and transported fish from the Sheboygan River. WDNR Staff from Wild Rose Hatchery and Besadny Anadromous Fish Facility were involved in various aspects of seeforellen gamete collection, with Peshtigo staff collecting biological data. Data for trout and salmon for all surveys was entered into the WDNR Lake Michigan Fish Tracking Database by Peshtigo fisheries staff.

Appendix. Map of locations referenced in report.

